PATENT SPECIFICATION (11) 1 455 069

1 455 069

(21) Application No. 45660/74 (22) Filed 22 Oct. 1974
(31) Convention Application No. 2 357 451 (32) Filed 17 Nov. 1973 in
(33) Germany (DT)
(44) Complete Specification published 10 Nov. 1976
(51) INT CL.² B60T 1/06
B60K 17/08
(52) Index at acceptance
F2E 2N2A2A 2N2C1B 2N2C2A 2N2C2B 2N2D1 2N2D2C 2N2D7

(19)

(54) A HUB TRANSMISSION

(71) We, HURTH VERWALTUNGS—GMBH., of Moosacher Strasse 36, 8 Munchen 40, Germany, a German Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to a hub transmission especially for electrically driven trucks, e.g. fork lift trucks.

Hub transmissions are known in which shoe brakes are provided in the hub or in the transmission casing. This arrangement is bulky, and in addition shoe brakes, with their bearing system and actuating means, are complicated and expensive.

In known electrically driven hubs the shaft of the electric motor mounted on the hub may be extended on the side remote from the hub, so that the shaft projects from the motor casing. The brake is mounted on this shaft stub. This arrangement lengthens the pivoting radius of the hub, so that the vehicle requires more space and, for example, the gangways between racks in warehouses must be widened. Thus the warehouse capacity depends to some extent on the pivoting radius of the hub.

An object of the invention is to reduce the pivoting radius of the hub and with it the space required by the vehicle, for example a lift truck.

This invention resides in a hub transmission, including a star gearing in the hub, and a plate-type brake provided in the hub or a casing of the star gearing. A particularly compact construction is if the brake is mounted coaxially with the sun or central gear of the star gearing, at least one inner brake plate is coupled to the central gear or a shaft fast therewith, and at least one outer brake plate is connected to a stationary member to prevent rotation but permit axial motion of this brake plate.

The invention will now be further described with reference to the accompanying diagrammatic drawing.

On a hub 1 a tyre 2 is fixed in a known manner. To steer the vehicle, the wheel can be pivoted about an axis 3 running approximately through the centre of the tyre. The pivoting motion is produced by a flange 4 or the like, which is pivotably mounted on the chassis (not shown) and can be driven to effect steering. The electric motor 5 to drive the wheel is screwed to the flange. The shaft 6 of the electric motor projects through the flange 4 and bears teeth 7 on its outer end. These teeth form a sun gear or central gear and mesh with one idler gear 8 of a star gear train whose second gear 9 meshes with the teeth of a gear 10. The latter teeth engage a ring gear 11, which either forms part of a casing 12 for the transmission or is fixed inside such a casing. The casing 12 and hub 1 are attached to one another with screws. Studs 13, 14 fixed to the flange 4 form bearings for the gears 8, 9, 10. Some of the studs 13 extend beyond the gears 8, 9 and are engaged by outer plates 15 of a multi-plate brake. The peripheries of the outer plates contain recesses conforming to and fitting onto the studs. The outer plates are coaxial with the central gear. Inner brake plates 16 are toothed to engage the teeth 7 on the shaft 6, and cooperate with the outer plates in well-known manner. A thrust member 17 in front of the outermost outer plate 15 has a central pin 18, mounted in the hub 1 and projecting outwards from it; separate bearings and sealing means (not shown) may be provided for the purpose of mounting if necessary. One arm 19 of a bell crank 20 pivotably mounted on the flange 4 bears on the pin 18. The other arm 21 of the bell crank is actuated from the chassis by way of actuating means, without interfering with pivoting of the flange 4: to this

end the actuating means engages in a bore 22 formed in the second arm 21 on the pivoting axis 3.

Traction on the actuating means causes the bell crank to pivot anticlockwise (in the drawing). Its arm 19 then presses on the pin 18 and therefore on the thrust member 17, which urges the inner and outer plates against one another so that the rotating shaft 6 and the rotating wheel 1, 2 are braked relative to the non-rotating flange 4 by means of the studs 13.

Since the braking system is substantially closer to the pivoting axis 3 than is the endshield 23 of the electric motor, the pivoting radius of the wheel is not increased by the braking system, in spite of its co-axial disposition.

WHAT WE CLAIM IS:—

1. A hub transmission, including star gearing in the hub, and a plate-type brake provided in the hub or a casing of the star gearing.

2. A transmission as claimed in Claim 1 in which the brake is a multi-plate brake.

3. A transmission as claimed in Claim 1 or 2, in which the brake is mounted co-axially in the hub relative to the inner central gear of the star gearing, at least one inner brake plate engages the central gear or a shaft connected thereto, and at least one outer brake plate is connected to at least one stationary member in such a way as to be fixed in respect of rotation but movable longitudinally.

4. A transmission as claimed in Claim 3 in which the stationary member is a stud fixed to a hub-carrying flange.

5. A transmission as claimed in Claim 4 in which the or each stud is a journal carrying at least one idler gear of the transmission.

6. A transmission as claimed in any of the preceding Claims, in which the brake can be operated by means of a thrust member or the like by way of an outwardly projecting member mounted on the rotational axis of the casing or hub.

7. A hub transmission substantially as herein described with reference to the accompanying drawing.

MARKS & CLERK,
Chartered Patent Agents,
57-60 Lincolns Inn Fields,
London, WC2A 3LS.
Agents for the Applicants.

Printed for Her Majesty's Stationery Office by The Tweeddale Press Ltd., Berwick-upon-Tweed, 1976.
Published at the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.

1455069 COMPLETE SPECIFICATION
1 SHEET *This drawing is a reproduction of the Original on a reduced scale*